Journal of the Society of Arts.

FRIDAY, JANUARY 22, 1869.

Announcements by the Council.

ORDINARY MEETINGS.

Wednesday Evenings at eight o'clock :—

JANUARY 27.—"On Xylography, or Printing and Graining from the Natural Surfaces of Woods." By WM. DEAN, Esq., sen.

FEBRUARY 3.—"On the Useful Application of Waste Products and Undeveloped Substances." By P. L. SIMMONDS, Esq.

FEBRUARY 10.—

FEBRUARY 17.—"On the Efficiency and Economy of a National Army in Connection with the Industry and Education of the People." By HENRY COLE, Esq., C.B. On this evening the Right Hon. T. MILNER GIBSON will take the chair.

CANTOR LECTURES.

The Second Course of Cantor Lectures for the present Session will be "On Painting," by S. A. HART, Esq., R.A., late Professor of Painting at the Royal Academy, and will consist of Four Lectures, to be delivered as follows :—

LECTURE I.—MONDAY, FEBRUARY 1ST.

On the History of Portrait Painting.

LECTURE II.—MONDAY, FEBRUARY 8TH.

On the Practice of Portrait Painting.

LECTURE III.—MONDAY, FEBRUARY 15TH.

On the Suggestions offered by surrounding circumstances to the Artist.

LECTURE IV.—MONDAY, FEBRUARY 22ND.

On Landscape Painting.

Each lecture will begin at eight o'clock. These Lectures are open to Members, each of whom has the privilege of introducing two friends to each Lecture. Tickets for this purpose are forwarded with this week's *Journal*.

FINAL EXAMINATIONS, 1869.

In order to avoid holding these Examinations on the same evenings as those of the Department of Science and Art, it has been decided to hold them, in 1869, on the evenings of

TUESDAY,	**the 20th**	**APRIL,**
WEDNESDAY,	**the 21st**	**,,**
THURSDAY,	**the 22nd**	**,,**
FRIDAY,	**the 23rd**	**,,**

From 7 p.m. to 10 p.m., instead of on the 27th, 28th, 29th, and 30th April, as announced in the Programme of Examinations for 1869.

In consequence of this alteration the Previous Examinations must be held earlier, and the Forms No. 2 and No. 4, referred to in par. 6 of the Programme, must of course be sent in a week earlier than the dates there fixed for receiving them.

It is very important that this alteration should be made as public as possible. For this purpose a number of small slips, to be inserted between pages 8 and 9 of every Programme sent out, have been forwarded to each Institution and Local Board. Large bills, to be suspended on the walls of the Institution reading-room, or in some other public place, will also be sent on application.

In reference to the subjects referred to in the notice at page 9 of the Programme, a sufficient number of applications from candidates in Conic Sections have already been received. A paper will therefore be set in that subject.

Candidates desiring to be examined in Navigation and Nautical Astronomy, Mining and Metallurgy, and Italian, should communicate their wishes without delay.

ELEMENTARY EXAMINATIONS, 1869.

Secretaries of District Unions and Local Boards desiring to adopt the Society's scheme of Elementary Examinations, are reminded that they must apply to the Secretary of the Society of Arts before the 10th of February, stating the number of male and female Candidates respectively desiring to be examined in each grade.

INSTITUTIONS.

The following Institutions have been received into Union since the last announcement :—

Greenwich (East), Science Classes, St. Mary's National School.
Ramsgate, Church Institute and Literary Society.
Spring Vale (Hammersmith, W.), Institute and Evening Classes.

ART-WORKMANSHIP COMPETITION.—1868-9.

The works sent in competition for the Prizes offered this Session are now placed in the Great Room, for the inspection of Members and their friends.

The following is a catalogue of the works received :—

FIRST DIVISION.

1. (D.) Earthenware Slab, with figures painted in enamel colours. By J. B. Evans, Howard-place, Shelton, Staffordshire Potteries. Price £4 4s.
2. (E.) Earthenware Vase, with painted ornament in enamel colours. By the above. Price £8 8s.
3. (M.) Design in Ivory and Gilt Metal-work, for cover of an album. By George Berry, 31, Brewer-street, Golden-square, W.
4. (N.) Clock Case, in amboyna and purplewood, with inlay of ivory. By Thomas Jacob, 4, Upper Charlton-street, Fitzroy-square, W.

5. (N.) Marquetrie Panel. Designed and inlaid by F. Braun, 12, Star-street, Edgware-road, W. Price £9.

5A. (P.) Centre of a Chimneypiece, a combination of mosaic and inlay with carved stone. By John E. Daly, 33, Medway-street, Westminster, S.W.

6. (Q.) Panel for a Cabinet, consisting of six different woods. Designed, carved, and inlaid by Thomas Godfrey, 21, Chatham-road, Wandsworth-common, S.W.

7. (Q.) Panel for a Cabinet. By Charles Line, 41, Prince of Wales's-crescent, N.W. Price £12.

8. (Q.) Panel Frame, carved in various woods. Designed and carved by E. T. Grove, 130, Albany-street, N.W. Price £5.

SECOND DIVISION.

9. (A.) Cases of Specimen Clock Dials. Nos. 1 to 6 enamel painted; Nos. 7 and 8 dead surface suitable for public buildings, as not reflecting the light; Nos. 9 to 11 glass dials in imitation of engraved dials, and superior to them for durability in consequence of the work being at the back. All the dials can be produced in any size. By J. Thwaites, 38, Spencer-street, Clerkenwell, E.C.

10. (B.) Frame for a Miniature, of strongly-gilt gilding-metal and enamelled; solder of 18 carat gold. Designed, traced, engraved, and enamelled by Frederick Lowe, 13, Wilderness-row, E.C.

11. (C.) Ring Tray, similar in material and process to the above. By Frederick Lowe.

12. (D.) Slab, for insertion in the frieze of a chimney-piece. By J. B. Evans, Howard-place, Shelton, Staffordshire Potteries. Price £6 6s.

13. (D.) Ditto. By the above. Price £4 4s.

14. (D.) Ditto. By John Slater, Field-place, Stoke-on-Trent. Price £6 6s.

15. (E.) Tablet for Monumental or Commemorative Purposes (unfinished, but sent to show design). By James Griffiths, Field-place, Stoke-on-Trent.

16. (H.) Book Cover, enrichment in gold upon coloured ground. By C. Pfander, 28, Bayham-street. N.W. Valued at £3 10s.

17. (H.) Ditto, enrichment in cameo tints upon black and gold grounds. By the above. Valued at £3 15s.

18. (I.) Set of Fire-irons. By E. Millard, 35, Little Clarendon-street, Clarendon-square, N.W.

19. (O.) Pedestal for a Bust, forming a clock case, consisting of carved marble combined with mosaic. By W. H. Barrett, 2, Alma-terrace, Fentiman-road, S.E. Price £18.

Articles sent in for exhibition, but not in accordance with prescribed processes:—

CARVING IN STONE.

20. Bracket, carved in Caen-stone. By John Barker, 2, Paradise-street, Lambeth, S.E.

21. Panel of Flowers, carved in Caen-stone. By the above.

22. Panel, carved in Caen-stone. By the above.

23. Child's Head, carved in Stone. By John Wallace, 162, Grove-street, Camden-town, N.W. Price £4 10s.

CARVING IN MARBLE.

24. Boy's Head, in Relief, a Portrait. By W. X. D. Price £2.

25. Medallion Head of Michael Angelo. By W. X. D. Price £2.

26. Bust of Queen Adelaide. By G. Bool, 9, Warwick-place, Pimlico, S.W. Price £12.

27. Carving in Relief. By Owen Thomas, 66, Harewood-street, N.W.

MODELLING IN PLASTER.

28. Bust, "Ophelia." By A. J. Smith, Great Northern Stone Wharf, Wharf-road, King's-cross, N.

29. Modellings, after Donatello, of St. Cecilia, and the Virgin and Child. By W. W. Price £5.

30. Portion of Ornament. By E. Gibbons, 5, Mary-street, Arlington-square, N.

31. Medallion, "Science Trimming the Lamp of Life," executed after cast of medal by Wyon. By R. C. Hindshaw, 23, Worsley-street, Regent-road, Manchester. Price £10.

32. Frame containing six emblematical figures of the Months. Designed and modelled by G. Morgan, 41, Pelham-street, Brompton, S.W.

33. Head of a Female, modelled from life. By the above.

METAL WORK.

34. Reduced copy in steel of the above. By the same exhibitor.

35. Embossing in Copper of a Yacht in full sail. By Robert Taw, 8, Prince of Wales's-crescent, N.W.

36. Wrought Iron Work for Cabinet. Designed by B. T. Talbot. Executed by G. Emms, 2, King-street, Old Kent-road, S.E.

37. Repoussé Work in Copper. By J. Gwillim, 19, Sidney-square, Mile-end, E. Price £20.

38. Renaissance Ornament in Copper. By G. Deere, 23, Weston-street, Pentonville, N. Price £10.

39. Specimens of minute engraving. The Creed, the Lord's Prayer, and the Ten Commandments. Engraved by hand, in black letter, on threepenny pieces. By W. Roberts, 146, Stanhope-street, Hampstead-road, N.W.

CARVING IN WOOD.

40. Head of our Saviour, carved in lime wood. By E. J. Broughton, 23, Queen-street, Webber-street, S.E. Price £6 10s.

41. Alto-relief in box-wood with ebony border, "Venus Genetrix." By Thomas Wills, New-road, Hammersmith, W. Price £15.

42. Bust of a Female in lime-wood. By William Cushing, 14, Cardington-street, N.W.

43. Panel of Flowers. Carved by Arthur Line, 19, Prince of Wales's-crescent, N.W. Price £4 10s.

44. Clock Case in walnut wood. By R. Flipping, 67, Charrington-street, N.W. Price £7.

45. Highland Dirk, carved in ebony. By John Sinclair, 6, Sutherland-street, West-end, Edinburgh.

46. Presentation Pipe, carved in sycamore. By the above.

NEEDLEWORK.

47. Specimen of Needlework for a Book-cover. By Miss H. Pfander, 28, Bayham-street, N.W. Price £3 5s.

PAINTING ON PORCELAIN.

48. "The Death of the Christmas Carol Singer." By J. J. Slater, Ricardo-street, Burslem, Staffordshire. Price £10.

49. Painted Birds, after Bouvier. By Frank Harris, Hartshill, Stoke-on-Trent. Price £1 11s. 6d.

50. Painted Trophies, birds &c., with green ground-laid border, with gilt raised ornamentation. By the above. Price £3 13s. 6d.

51. "The Death of Goliath." By John Eyre, 16, Newman-street, Oxford-street, W. Price £5 10s.

52. "The Virgin and Child;" after Titian. By "Pax."

53. Figures. By W. P. Simpson, 6, Queen's-road, Bayswater, W. Price £10 10s.

54. "Giving a Bite;" after W. Mulready, R.A. By the above. Price £26 5s.

55. Study from Life. By W. P. Rhodes, Liverpool-road, Newcastle-under-Lyne.

56. Flowers. Painted by J. Longmore, 14, Hardinge-street, Fenton, Stoke-on-Trent. Price £1 1s.

57. Portrait from a photograph, worked with a crayon on a glazed surface, and fired. By A. B.
58. Portrait from a photograph. By the above.
59. Head of Our Saviour, from an engraving by Sharp, after Guido, by the same process as No. 57. By the above.
60. "Pluto." Painted on blackware, after the style of the Limoges Enamels. By W. H. Slater, James-street, London-road, Stoke-on-Trent.

Proceedings of the Society.

MUSICAL EDUCATION COMMITTEE.

This Committee met on Thursday, the 14th instant, and determined that before recommending any steps on the part of the Society, in reference to a standard musical pitch for this country, it would be desirable to ascertain whether any uniformity of musical pitch exists in the principal cities of Europe, and they resolved to take measures forthwith for obtaining this information.

SWINEY PRIZE.

20th January, 1869.

A meeting of the adjudicators of this prize, appointed by the will of the late Dr. Swiney, was held this day at the Rooms of the Society of Arts, J. Risdon Bennett, M.D., in the chair.

The Secretary read the advertisement convening the meeting.

Read the following minute of the Joint Committee :—

A meeting of the Joint Committee of the Society of Arts and the Royal College of Physicians, was held at the Rooms of the Society of Arts.

There were present—

The Right Hon. the Lord Chancellor in the chair Sir William H. Bodkin Samuel Redgrave, Esq. Benjamin Shaw, Esq. Seymour Teulon, Esq.	On the part of the Society of Arts.
James Alderson, M.D., President of the Royal College of Physicians James Risdon Bennett, M.D. Frederick John Farre, M.D. Henry Alfred Pitman, M.D. Sir Thomas Watson, Bart., M.D.	On the part of the Royal College of Physicians.

Read the clause in the Will of the late Dr. Swiney referring to this bequest.

Resolved unanimously, to recommend that the award of the Prize be this year made in favour of William Augustus Guy, M.D., the author of a published work entitled "The Principles of Forensic Medicine."

(Signed) HATHERLEY,
Chairman.

Resolved, that the Prize, a Silver Goblet value £100, and gold coin in it to the same amount, be adjudged, and the same is hereby presented, to Wm. Augustus Guy, M.D., the author of a published work entitled "The Principles of Forensic Medicine."

SEVENTH ORDINARY MEETING.

Wednesday, January 20th, 1869; ANTONIO BRADY, Esq., Member of Council, in the chair.

The following candidates were proposed for election as members of the Society :—

Alabone, Edwin George, Earlswood-house, Hackney, N.E.
Barrow, Captain Robert Knapp, Naval and Military Club, Piccadilly, W.
Clare, Walter Frederic, 16, Trafalgar-road, Old Kent-road, S.E.
Davison, William, 1, Lupton-villas, Tufnell-park-rd., N.
Dipnall, Mathias, S.S., Christ's Hospital, E.C.
Jones, Robert, Manor-house, St. John's-wood-pk., N.W.
Proctor, George James, Newport, Isle of Wight.
Smith, John Whittet, Elvet-house, Clapham-common, S.W.
Stone, John Benjamin, F.G.S., Union Glass Works, Dartmouth-street, Birmingham.
Walker, Lieut.-Col. W. L., 84, Inverness-terrace, W.
Wright, Henry Edward, St. Mary's National School, East Greenwich, S.E.

The following candidates were balloted for, and duly elected members of the Society :—

Armstrong, George Frederick, C.E., 37, Norfolk-street, Strand, W.C., and 10, Albion-place, Doncaster.
Campbell, George, 60, St. George's-square, S.W.
Croll, Alexander, Sussex-house, Tudor-road, Upper Norwood, S.E.

The Paper read was—

PHOTOGRAPHY AND THE MAGIC LANTERN APPLIED TO TEACHING HISTORY.

BY SAMUEL HIGHLEY, ESQ., F.G.S., &c.

In January, 1863, just after the close of the International Exhibition, I had the honour of reading a paper before this Society on "The Application of Photography to the Magic Lantern Educationally Considered," on which occasion I demonstrated how every conceivable branch of science and art might be illustrated by lantern slides, produced by means of photography in a manner that at once raised that toy of the nursery, the magic lantern, into a valuable philosophical instrument and educational tool. I pointed out how, by aid of the ordinary, the astro, the spectrascopic, and the micro-photographic camera, we made Nature become our artist, and forced her to depict her wonders with her own pencil of light on our chemically prepared glass slides—how in this manner truthful transcripts from nature were delineated by a faithful and an unbiassed hand, where detail was a *sine qua non*, and in a manner that the hand painter could never approach, much less rival, even if we gave him a surface four times the size of that employed by the photographer, which then would entail projecting apparatus as cumbrous and costly as that employed at the Polytechnic Institution, alike unsuited for the convenience or the pocket of the travelling educational lecturer. In the one case all the details of a microscopic object of the most complex structure, the crevassed range of the Mer de Glace, or the wide-angled landscape of the Falls of Niagara, may be depicted with every detail within a three-inch square with a fidelity which the hand painter could not rival, if he could equal, within a six-inch square.

Another point on which I strongly dwelt was the impressive character of a large photographic lantern picture, on which the lecturer could fix the attention of his class, while describing the subject under discussion, as compared with the tiers of ordinary paper diagrams, over which the eyes of idle students listlessly wander.

The collection of slides then exhibited in illustration of the suggested system of instruction met with the strongest expressions of approval from the leading educationists of your Society, and the Photographic Society

of Scotland at a future period awarded them a special silver medal.

There is one thing, however, that photography could not do—it could draw our pictures, but it could not paint them; the day may come, however, when even that apparent miracle may be accomplished, for, recollect, that great master in science, Michael Faraday, who has lately passed from among us—not great in age, but great in the esteem of men—has bequeathed to Mr. Warren De La Rue the daguerreotype presented to him by Becquerel, whereon nature had reproduced a coloured figure from her own palette; and that precious specimen still exists, unfaded,—a promise for the future.

The paper to which I refer attracted the attention of a young officer in the Russian artillery, an amateur photographer, who has since become not only a distinguished professor, but Inspector of the Military Colleges of Russia. With the courage of youth, he determined to introduce the thin end of the wedge into the old system of instruction, where he had the power to use it, in his own lectures on General History by illustrating them with photographic slides and the lantern.

This notion is now *un fait accompli*, and I think it will be a step in the right direction, for though the lantern has been employed at institutions and in schools, it has never yet been used in colleges, and he would be a bold man who would venture to suggest to the Dons of Oxford or Cambridge the introduction of a magic lantern for illustrating the University courses on History. But why not? "Because it has not been done before" is not a sufficient answer in these days of rapid progress and wide reform. I think I shall be able to show you, that by a well selected and carefully executed series of pictures from authentic data, we may take the student back into time, and make him familiar with the aspect of the people of the various nations, their costumes, the buildings they erected, the chambers in which they lived, prayed, or died, the vases with which they decked them, the gods they worshipped, carved in ivory and gold and of prodigious size, their manners and customs, how they lived at peace and in war, their modes of attack upon an enemy, and in what grandeur they carried their illustrious dead to the grave. In thus appealing to the eye we establish a system of artificial memory, next best to the student having seen these records and relics of man's history on earth, in a manner that the most impressive, verbal, or printed descriptions could never convey to his mind, and so in these days, when a wider range of knowledge is expected from our educated classes, we may hope to establish a more rapid and impressive system of instruction, and of a kind not so likely to pass out of the student's mind after he has left school or college.

The time at my disposal this evening will only permit me to show you but a few examples, taken at random from the extensive series of designs that have been prepared to illustrate Col. Tchepelevsky's course of lectures on the "Manners and Customs of Nations, from the earliest Historical Periods to the Present Day," and this is how it came about that I am able to place these specimens of what has been done before you. At the beginning of last year this gentleman travelled through the Continent to see for himself who were the best producers of photographic lantern slides. Germany, France, and England were visited. Many halves of stereographs of subjects of historical interest were purchased on the Continent, but I am happy to say he found that the reproductions required from the great antiquarian works were turned out better in England than on the Continent, not only as to the brilliancy and clearness of the plain positives, but in the very important matter of brilliant and transparent colouring. In fact he found our Continental neighbours curiously behindhand in all matters relating to the lantern as an educational instrument, excepting for experimental physics. I may here state that the beautiful transparent positives of Ferrier and Soulier, and other continental photographers, sold in this country for lantern use, are not specially printed for that purpose, but are the perfect halves of broken or damaged stereographs that are thus utilized, which accounts for the density of many specimens that come into our hands, and the unsuitability of others for colouring. The samples I furnished being approved, the necessary lantern apparatus was ordered and supplied, and in the autumn of the past year I received a commission to reproduce 120 subjects, mostly of an elaborate character; these had to be re-drawn in a special manner for the nature of the work in hand, negatives made, positives printed and coloured in duplicate, and to be delivered in St. Petersburg within two months. Considering that the order was given at the worst season of the year, from a photographic point of view, it became a matter of anxiety as to how often the November fogs would make themselves "a darkness that would be felt." However, nature, artists, photographers, and colourers being propitious, the work was accomplished, the works known as the best authorities on Assyrian, Persian, Egyptian, Grecian, Roman, and mediæval history being ransacked to supply the necessary material, the officers of the British Museum courteously rendering me every facility for the artists I engaged on the work.

Before proceeding to show these views, I will give a rapid survey of what has been done in regard to lights and improvements in our projecting apparatus since the date of my former paper on this subject.

SOURCES OF LIGHT.—Many heads have been at work within the last five years, trying to discover compounds and forms of lamps that will give a great amount of light with the least amount of trouble and discomfort in preparation, to meet the requirements of amateurs who only require the lantern for occasional family use, or for those who are nervous as to employing the most powerful light-giving apparatus; others have been trying to obtain still greater power out of the oxy-hydrogen jet, and simpler or safer ways of manipulation; and a few to secure the most intense light attainable by man, that should even outrival and render him independent of old Sol as a source of light, who too often hides his bashful face in this our favoured clime of England, when we most want his assistance, and in this bold aspiration, almost as daring in thought as that of the builders of Babel, Wilde has been successful—for, from a pair of carbon points, ½-inch square, placed on the top of a lofty building, the light evolved was sufficient to cast the shadows of the flame of street lamps a quarter of a mile distant, upon a neighbouring wall; while at noon, on a clear day in the month of March, the direct rays of the sun took *one* minute to darken a piece of sensitive photographic paper, the light emitted at two feet from the reflector of this electric lamp darkened it to an equal degree in 20 *seconds*; and on a day in June, Mr. Crookes estimated that this electric light had three or four times the luminous and calorific power of the sun at mid-day, and this at a cost of only one half-penny per hour, practical not theoretical value, for the driving power of this giant induction machine of Mr. Wilde's invention.

Mr. Crookes further remarks that, "It would be an interesting problem to calculate what would be the result of driving the 32-inch armature required for a 100-ton magnet, with (say) a 1,000 horse-power steam-engine. If the power generated by this machine did not at once burn up the working parts, dissipate the electric lamp and conducting wires with a mighty explosion into space, and strike dead all the attendants with one lightning flash—if it were at all manageable, and were put on a high tower, it would probably give light enough to make London by night considerably brighter than London by day."*

ARGAND BURNER.—We have tried to improve on the old fashioned camphorized sperm oil lamp, and to this

* See "A New Era in Illumination," by W. Crookes, F.R.S.—*Quarterly Journal of Science*, October, 1866.

end have employed paraffin oil, which gives a most brilliant light, but has the drawback that the vapour from the wick evaporates and covers everything within the lantern with an oily dew when not in use, and the oil itself oozes through the slightest flaw in the metal-work of the lamp, and produces a result alike unpleasant to smell and touch. If the lamps are constructed so as to place the reservoir outside the lantern, and proper samples of oil are employed, paraffin is perfectly free from danger. The pleasantest way, however, is to use the crystallized or solid paraffin. This gives a pure white brilliant light, is perfectly free from smell or danger, and if spilt immediately solidifies, and can then be peeled off anything it settles on; the only drawback is, it takes a long time to melt a mass of it, and this is not always convenient. Where house gas is always attainable, a naphthalized argand burner furnishes one of the most convenient lamps for all ordinary purposes, as it gives a brilliant light, requires no trimming, and is ever ready for use.

MAGNESIUM LAMPS.—This source of light has attracted considerable attention, as it emits a most intense beam; but, though from its richness in actinic rays it is admirably suited to the requirements of photographic enlargement, it has great drawbacks when applied to the exhibition of magic lantern pictures. Firstly, the dense white fumes must be removed by a cumbrous arrangement of stove pipes, for, as yet, we cannot absorb the vapours, as generated, by any practical chemical arrangement; secondly, the light is a flickering one, and a dancing landscape is not a pleasant thing to contemplate; and thirdly, the characteristic blueness of this light injures the tone of such pictures as require copper-coloured skies, or red sunsets; for it must be borne in mind that we cannot be always showing plain photographs, or coloured moonlight, ice, and snow scenes, for which, on the other hand, it is well suited. Two forms of magnesium lamp are now in the market; in one a ribbon of the metal is burnt, in the other magnesium powder mixed with sand falls on the flame of a spirit lamp or gas jet. This is known as Larkins's patent.

OXY-HYDROGEN LIGHT. —The oxy-spirit and oxy-house-gas jets still retain their old form, but the myth of "safety jets" is passing away—that is to say, the notion of securing safety by wire gauze or water chambers —as cases are on record where the mixed gases have passed back and exploded in the reservoirs. The whole secret of safety lies in a nut-shell. Keep the oxygen and hydrogen in separate bags; always have sufficient and equal pressure-weights on both bags, and never remove the weights from either bag while the gases are burning. I am now referring to all forms of jets where the gases are mixed just before they issue from the nozzle, and impinge in an ignited state upon the lime ball. If the above rules be followed, it is better to employ jets freed from all the impedimenta of longitudinal wires and cross fences of wire gauze, or safety-valves of other constructions; to paraphrase the well-known order, I would say—"Put your trust in Providence, but keep your pressure up." The bore of the nozzle, in relation to the pressure employed, is a matter of importance in the proper construction of a jet; for, if too large, the gases run back and burn within the nozzle tube, often causing a series of sharp explosions, which, if not dangerous, are unpleasant to the ears of a nervous exhibitor or of the audience.

CONDENSED GAS SYSTEM. — Undoubtedly the usual arrangement of gas bags, pressure boards and weights, is a cumbrous one, though presenting advantages to the travelling lecturer in other ways. The Americans have lately advocated the method of condensing the gases in metal bottles, as presenting the advantages of compactness and extreme portability, economy, with the greatest amount of pressure attainable, which in other words means security from the gases mixing, running back and exploding, and also increased intensity in the light produced. By this arrangement the gases may be kept at hand any length of time, and ever ready for use which is not the case when the gases are stored in India-rubber bags, for by an endos- and exos-motic action, they pass through the pores of such receptacles, and become deteriorated and unfitted for use in the course of a few days. As regards comparative space occupied, while a single gas bag of 6 cubic feet capacity within its pressure-boards would measure 36 by 24 by 24 inches when filled, and its weights 17 by 6 by 5 inches, a pair of 6 cubic bottles would only occupy a space of 30 by 12 by 6 inches when packed in a stout travelling-case. As regards comparative cost, a stout gas bag with pressure-boards and weights would cost £4 14s., while a bottle in case would only cost £2 12s. 6d.; and the bottle will not wear out, while the gas bag must every now and then be replaced. As these bottles must be sent to the manufacturers to be pumped full, the cost of the generating apparatus is also saved. This leads us to the only drawback to the system; the bottles must be sent to be re-filled, as the pumping apparatus is costly, and requires the greatest care and experience in manipulation; in fact, the only danger in this system occurs at this stage of filling. But though, undoubtedly, this is a drawback to those who have to lecture night after night, the amateur, on the other hand, would regard the saving him the trouble of making the gases as an advantage; and he has only to make a point of returning the bottles to be re-filled immediately after each exhibition to obviate this one drawback, especially as he can obtain the gases cheaper than he could make them for himself. To the photographer this form of apparatus presents great advantages for enlargements, being ever ready for use. But this system is not a new one, for it was employed 20 years ago by Mr. Adams, the well-known lecturer on astronomy and physics. A pair of condensed gas bottles are before you, so that you may judge of the intense light obtainable. They consist of wrought-iron cylinders, 2½ feet 3 inches long by 4½ inches in diameter, capped with most carefully constructed valves worked by lever regulators, and are capable of holding 6 cubic feet of condensed gas. These are tested before sale to 60 atmospheres, or a pressure of 900lbs. on the square inch, and as the pumping pressure seldom exceeds 25 atmospheres, or less than half the test pressure, perfect immunity from danger is insured. *A priori*, we should fancy that as the pressure is always on the decrease, the light would also be decreasing, unless the valves were under constant regulation, but practically this does not happen; for, if properly manipulated, we have not to alter the taps more frequently than with the gas bag arrangement. The 6 cubic feet will last 2 hours, though by careless working they might be used up in 20 minutes, or even in as many seconds.

LIME BALLS.—Though some samples of lime will last one, two, or three exhibitions, as a rule it is so hygroscopic that two must be used during one lecture, and if not kept carefully excluded from air by packing them in close-fitting tubes—and even then I have known them to swell and burst open the receptacle—wrapping them in waxed paper, or covering them with a thin skin of india-rubber by dipping them in a solution of rubber in benzole, they will swell and fall to pieces. To obviate this, magnesia has been proposed as a substitute. I have tried a composition of magnesia and plaster of Paris, but before the mixed gas jet it fused and frothed up, unless mixed with a saturated solution of bi-silicate of potash, which, however, imparted a pink tint to the flame; the same with meerschaum, a silicate of magnesia, producing just the opposite objection I raised to the blue magnesium light; probably pure magnesia, greatly compressed by a powerful hydraulic press, would produce the desired material, but it is difficult to obtain the use of such a costly machine for this purpose. Lastly, we have heard a great deal about the employment, in Paris, of a zirconia cylinder, which is said to be superior, not only as to its incandescent qualities, but as to its indestructible nature—a most important property, as it would save the expense not only of a multiplicity of

cylinders, but of the lime clocks we are forced to employ when great pressure is used with the mixed gases, to prevent the cylinders pitting, and so getting out of focus of the optical part of the lantern. As yet I have not been able to obtain a specimen of these zirconia cylinders, or I would have shown their qualities.

OXYGEN GENERATING APPARATUS.—As the lime-light lantern has come into extensive use among amateurs since photography has been employed in the production of slides—many gentlemen taking records of their tours with pocket cameras, and, from the negatives obtained, have transparent positives printed, and then show their friends these reminiscences of travel on a larger scale—it is judicious that the philosophical instrument maker should render the apparatus easy of manipulation, and make every possible provision against accident. To this end I have re-arranged the oxygen-generating apparatus, in such a manner as to provide against various contingencies:—First, I enclose my retort within a light iron jacket furnace, so that I not only prevent a great amount of heat being dissipated, but secure the upper surface of the mixture of chlorate of potash and oxide of manganese being melted as well as the lower portion directly over the charcoal or gas-burner, as I found that there was a great tendency for the light powdered manganese to separate and float upon the surface of the melted chlorate of potash, and when the oxygen bubbled briskly through the upper and cooler stratum, it carried this damp powder forward, and often choked the delivery tubes; I further got over this source of a blow off by using coarse-grained oxide of manganese, instead of the powdered, which answered equally well, as the action of the manganese is mechanical, not chemical, for sand, a non-oxygen yielding body, will answer in its place. In case, however, of the tubes becoming accidentally choked, I provide the retort with a metal safety valve, through which the oxygen finds vent. The second source of accident arose if the operator did not disconnect his retort from the wash bottle as soon as all the oxygen was given off from the mixture, for nature, abhorring a vacuum, sucked in the water from the wash bottle upon the red hot mixture, and, converting it into steam, a blow-up terminated the operation. This arose from the delivery pipe passing directly into the water, so I dispensed with this kind of action by dividing my wash bottle into two chambers, and arranging my tubes so that the one in connection with the retort did not come in direct communication with the washing water. A shield at the exit pipe prevented the spray being blown into and wetting the gas bag. Again, the oxygen sometimes came off with a rush, instead of in a quiet orderly fashion, and would blow off the rubber tubes, if it did no worse. This is provided for by arranging the jacket, so that it and its contained retort can be removed from the charcoal pan, or if gas is used, by simply governing too violent or torpid action by the tap provided.

ELECTRIC LIGHT.—This, from the trouble attending the fitting up and charging a number of battery cells, which give off nitrous acid fumes, is seldom employed, excepting at institutions where an attendant is accustomed to the drudgery of this unpleasant operation; and even when Wilde's machine comes into more general use, from its cumbrous appliances this source of light can only be employed in fixed localities; nevertheless, it is *the* light of all others for optical experiments, and for the lantern microscope. The ordinary electric regulator provides for bringing a pair of carbon points in contact, and then separating them to a distance proportionate to the electric power employed, so as to produce what is called "the electric arc," that is, an electric flame carrying incandescent and vaporised carbon from one pole to the other, and whenever the striking distance between the two poles becomes too great, it automatically brings them nearer, or "makes up," as we say, or if the distance has been overstepped by the breaking off of a piece of the carbon poles, &c., then it brings them in contact again, and repeats the operation so as to produce and keep up a constant point of light. On the precision of this action depends the value of the regulator. Usually fifty battery cells, arranged for "intensity," are employed, seldom less than twenty cells. Of late we have heard that "an electric regulator," worked with six cells, produces a beam that will supersede the lime-light. Now, as a regulator in no way adds to the battery power, to those who have not been accustomed to get a quart of wine out of a pint bottle, this is rather a startling announcement, especially when we are told that a nine feet disc can be brilliantly illuminated by this small number of cells. The power being so small, a pair of very fine pointed carbon poles are kept touching each other, so that we may call this "the contact system" in contradistinction to the arc-producing method previously described. I will show you the contact light from seven cells, and then the light emitted from fifty cells, by means of a new form of regulator, on the usual system, which I have not hitherto publicly exhibited or described. This is an invention of Mr. Malden, one of our most expert public lantern exhibitors, though professionally a wood engraver, and is not only the most sympathetic, self-adjusting regulator, giving a steady point of light, central with any optical arrangement, for as long a time as the source of electric power remains constant, but is the simplest in construction and the cheapest I am acquainted with. In this arrangement the rod that carries the upper carbon is weighted, and rests upon an air-ball placed in a cylindrical chamber; an exit pipe from the ball is closed by a stopcock, which can be opened or shut by the action of an electro-magnet placed in the circuit on a lever arm fixed to the stopcock; a counterpoise spring being attached to the other end of the lever arm to adjust the action according to the amount of battery power employed. On the air ball being filled by a little bellows, the two poles of the regulator are separated, and a connection being made, the poles fall together, as the stopcock is open till such time as they touch, when a circuit being established, the armature of the electro-magnet is pulled down and then closes the stop-cock, but the poles at once separate to the striking distance of the battery-power employed, and, as they burn away, the stop-cock is slightly opened, so that a small quantity of air escapes, and thus allows the upper carbon gradually to descend, while by a pulley arrangement the lower carbon is simultaneously raised in the required ratio of the combustion of the upper to the lower carbon, viz., 2 to 1; thus securing centrality with the optical apparatus employed. Should a portion of carbon break off, the striking distance being over-stepped, the current is broken, and the stop-cock is again opened, when the poles are rapidly brought into contact, again to start apart in automatic adjustment. This arrangement is well suited for lighthouse purposes, as from its extreme simplicity of construction it could be readily kept in working order or repair by a man of ordinary intelligence, and this cannot be said of the beautiful, but complicated, regulators usually employed

NEW SYSTEM OF LANTERN APPARATUS.—Having given a *resumé* as to what has been done in improving our sources of light since 1863, I may state, that with the weaker ones, such as may be classed under the head of "hydro-carbon lamps," I found we must also look to our optical appliances to aid us in picking up all the light we could seize on to make the argand lantern what is desired for showing photographic transparencies, and for this purpose I introduced a triple condenser, which, in other words, means one of shorter focus than that in ordinary use, that enables us to get our light closer to it, and consequently to seize upon a greater number of the emitted rays. But this was not all. The sharpness and detail in photographic slides requires an achromatic lens for the necessary definition of the image on the screen, but a photographic portrait lens, or any double combination lens, absorbs too much of the light,

which we can ill-afford to lose, so I employed a single achromatic power of wide angle, to secure as large a picture as possible at a short distance from the screen, and I thus obtained a really brilliant and well-defined 10-foot picture, though I only aimed at an 8-foot one in the first instance.

The next point was to arrange all the apparatus in such a way as to bring it within the smallest packing compass, and render the lecturer as independent as possible of the ordinary obstacles that present themselves in a strange place. In the same box with the lantern, I packed a cabinet to contain the slides, so contrived that they were always kept in methodical order for use, were never exposed to meddlesome hands, and could be put under lock and key the moment the exhibition was over. Over this cabinet slipped a shell-frame, and when the case was unpacked all these parts could be clamped one above the other to form a stand for the lantern, which was then raised so as to be exactly central with the screen employed. The screen I use is opaque, white and seamless, having the appearance of flexible whitewash, and is the finest surface on which to exhibit views to the greatest perfection. This is obliged to be wound on a roller to preserve its face. The packing-case for this, likewise, forms a supporting framework, so that by the above system I am able to place all my apparatus in any position I desire, untrammelled by the presence of furniture or wall pictures, that would, under ordinary circumstances, have to be removed. The apparatus can be arranged in a few minutes—and I can pack it all away as quickly, thus giving the exhibitor the greatest amount of independence and the least amount of trouble in arranging his appliances.

I use a pair of the condensed gas bottles, arranged in connection with a gas dissolver, the invention of Mr. Malden,* but which I have since brought into very compact form, all being worked by a single cock and lever-arm. This arrangement dispenses with the use of the ordinary "dissolving fans," and gives the exhibitor far greater power in producing dioramic effects, for by the old method the lights in both lanterns were always and unchangeably of equal value, but by adjusting with a lever arm, this gas dissolver allows of an exact balance being established betwen the screen and the superposed "effect," while both gases are economised, for if "dissolving" from one scene into another, the oxygen is gradually turned quite off one lantern, and only a small jet of hydrogen is left alight, for obvious requirements.

I have now ended my survey of the last five years' progress in lantern appliances, and I will proceed to exhibit the series of historical slides. In conclusion, I must say that the honour of introducing this system of instruction into our collegiate establishments and higher branches of education is due to Colonel Tchepelevsky, backed by the Russian Government; thus, as I have said, in a foreign country he has introduced the thin edge of wedge, and I will use all my power to hammer it home.

Mr. Highley then exhibited in the magic lantern a series of fifty coloured views and photographs, illustrative of the architecture, art, costumes, and manners of ancient and mediæval times.

SOCIETY OF ARTS.

(*Continued from p.* 132).

South Kensington Museum.

Thus far I have attempted to indicate some of the steps taken by the Society to aid the object to which the surplus of the Great Exhibition was to be applied. But during the same period the Royal Commissioners were not idle, for they had invested their funds in the purchase of an estate at Kensington-gore, jointly and in co-operation with the government; the Schools of Design were removed from Marlborough-house to the Gore-house estate; and, the commissioners, in addition, had erected a temporary building in which were placed such specimens as had been presented to them at the close of the Exhibition of 1851, as the nucleus of an Industrial Museum. The Society also entered into an arrangement with the Royal Commissioners, and undertook the collection of a Trade Museum, consisting of a series of animal products, illustrative of their uses in manufactures.

The collection thus begun, the value of the collection now stored there and belonging to the nation, had yet to do its work; and it is due to Mr. Henry Cole, that I should state that it is to his unremitting exertions that the country is indebted for the museum as it now exists; it is to him also that the Society is indebted for much valuable aid both in suggesting and carrying through many of the works undertaken. By his co-operation with the other members of the Executive Council, the Great Exhibition of 1851 was carried through to a successful issue; and it is under his superintendence that the South Kensington Museum and the Schools of Design have attained their present proportions. Of the use which the students of the Schools of Design have made of the collection there gathered, it is not my province to speak; I must rather confine my attention to the Society of Arts. What, then, are the uses to which the Society has applied the collection at South Kensington? I have stated above that the Society endeavoured to promote a more perfect education of the people as a means of improving the arts and manufactures of the country. So soon, therefore, as the museum became available, the Society, by directing attention to the works of art there collected, has fostered a love of art in the workman, and by issuing examples either cast or photographed from objects in the museum, and offering prizes to art-workmen for the reproduction or adaptation of such arts and processes to modern manufactures, has led to the investigation of processes which, in combination with our present mechanical appliances, may be productive of new industries. It is here that we see the importance of scientific knowledge, and its bearings upon industry. Without chemistry, the nature of enamels and methods of producing colours and working metals are a mystery to the workman. Without a knowledge of mechanics, the power of multiplying and reproducing economically the tesseræ of the present day would, as well as many other products of industry, have failed. Without art and a thoroughly intelligent knowledge of the mechanical capabilities of the lace machine or the loom, and the means of combining the skill of the artist with the reproductive power of those machines, our fabrics would remain mere imitations produced by rule of thumb, after patterns handed down to us. The want of a higher scientific training on the part of the English as compared with the foreign workman, has again been brought prominently to view by the Great International Exhibition of 1862, and more recently by the French Universal Exhibition of 1867.

Exhibition of 1862.

The Exhibition of 1862, like that of 1851, had its origin within the Society; by it the preliminary steps were taken, and the guarantee fund of £400,000 was raised; by it the Charter of Incorporation was sought and obtained, and the executive, appointed by the Charter, was named. But, unlike its predecessor of 1851, it failed to produce a surplus profit—a result much to be deplored, as upon it a considerable sum was spent with a view to the permanence of that portion of the building in which the exhibition of pictures was held, and in the completion of which large sums would have been expended in the promotion of new art industries, and the development of new manufactures. The rapid advance which England had made in her art education, between the periods of 1851 and 1862, made itself felt by our foreign competitors; but the deficiencies of her scientific training of artizans were also much remarked upon. So great,

* See *The British Journal of Photography*, March 29th, 1866.

indeed, had been the advance of English art-workmanship in 1862, that a number of French artisans were sent by their Government to this country to visit the Exhibition, and to examine and report each on his respective trade.

PARIS EXHIBITION, 1867.

Artizans' Reeports.—The Council of the Society, feeling that a like action in reference to the French Exhibition of 1867, would be equally beneficial to the workmen and manufacturers of this country, determined to create a special fund for the purpose of sending selected English workmen to visit and report on that Exhibition. This fund, which amounted to the sum of £1,039 19s. 6d. H.R.H. the Prince of Wales (President of the Society) opened with a donation of thirty guineas, the Society giving a hundred guineas from its funds, H.M. Government contributing £500, manufacturers and members contributing the remainder. The sum so raised enabled the Society to send about eighty workmen to Paris, who, on their return, each presented a written report, and the whole of the reports were published at the close of the year, forming an octavo vol. of upwards of 700 pages.

The result of those reports was practically this:—We, the workmen of England, are not afraid of our foreign competitors in reference to the majority of our staple products; but if we are to keep pace with our foreign rivals, in the artistic and scientific departments of industry, we must be afforded greater facilities for acquiring a larger amount of artistic and scientific instruction.

I must now go back to an earlier period, and refer to the establishment of the Society's Union of Institutions, which, however, I shall speak of more at length further on.

Seeing, then, that the Society's endeavours in connection with Exhibitions were to result in the application of the large surplus obtained from the Exhibition of 1851 in the promotion of the industrial education of the people as the most efficient means of promoting, improving, and extending the arts, manufactures, and commerce of the country, the Council of the Society of Arts felt it to be their duty to consider what steps they should take in order to aid so important a work. In November, 1851, Mr. Harry Chester, as one of the originators and President of the Highgate Literary and Scientific Institution, addressed a letter to the Council of the Society, proposing that an effort should be made to develop existing and to create new institutions of the class called Literary and Scientific Institutions and Mechanics' Institutes, and to affiliate them with the Society of Arts. "The exhibition," he said, "had given us some very significant hints that it is not only the education of our poor children that needs to be improved." In the address of the Chairman of the Council, read by Mr. Harry Chester, in November, 1853, it is stated, "The Council is thoroughly convinced that an improved education for the whole people, rich and poor, adult and child, is the first requisite for the improvement of manufactures, commerce, and art; that a liberal measure of science must enter into that education, and that it is the duty of the Society to promote vigorously that object."

As one means of bringing about this important result, the Council, at the suggestion and with the aid of Mr. Harry Chester, directed its attention to the condition of the Literary, Scientific, and Mechanics' Institutions established thoroughout the country, as suggested in his letter; and the managers of those Institutions, when addressed upon the subject, lamented with one voice that they were unable to maintain in efficiency their classes for systematic instruction. To aid the Institutions to accomplish an object so much desired, a Union of Institutions was established in connection with the Society, and the Council instituted a system whereby examinations are held, and the progress of the class students is tested. Prizes and certificates are awarded to the most successful among them. At a later period, His Royal Highness the Prince Consort, ever anxious to aid the Society in any good work, established an annual prize of twenty-five guineas in connection with the examinations then established, which is awarded to that student "who in this and the three preceding years shall have obtained the largest number of first-class certificates;" thus holding out an inducement to a continuity of study. This prize Her Most Gracious Majesty the Queen has been pleased to continue.

It is unnecessary that I should give further details as to the working of the Union of Institutions. I may, however, state that, in order to form the union, a conference of the managers was called, the result of which I shall speak of when I refer to the educational action of the Society.

EDUCATIONAL EXHIBITION.

The Society had, however, no sooner entered upon this work than it felt that the ignorance which generally prevailed in reference to the educational appliances, not only of this country, but also of the systems and appliances of foreign countries, required to be removed; and, with this object, it arranged and opened to the public, on the 4th July, 1854, an educational exhibition, in connection with which lectures were delivered, and the systems pursued in foreign countries and in America, and by the educational societies of our own country, were illustrated, and the methods of applying them pointed out. This Exhibition originated the permanent Exhibition of educational books and apparatus which is now a division of the South Kensington Museum, and Mr. Harry Chester must be recorded as the founder of it.

INDUSTRIAL INSTRUCTION.

Nor was this action arrived at hastily, for in 1853 a committee was appointed "to take into consideration, and to report how far, and in what manner, the Society of Arts may aid in the promotion of such an education of the people as shall lead to a more general and systematic cultivation of Arts, Manufactures, and Commerce, the chartered objects of the Society." The inquiry thus directed was carried out most broadly. I cannot attempt to do more than state that merchants, manufacturers, mechanics, and agriculturists were unanimous in their call for a higher scientific and greatly-improved general education—views which were expressed to the Committee in writing—nor was the inquiry restricted to gentlemen unconnected with the practice of education, but communication was entered into with the masters of endowed grammar schools, private schools, and Mechanics' Institutions, with the same result. The report of the Committee, with its appendices, was printed in the form of an octavo book of over 200 closely-printed pages.

The Council of the Society, during the session of 1867-8, again appointed a committee to inquire into the subject of technical education, and the best means of promoting it, and the first report of that committee was laid before the Society in June last.

It is unnecessary for me to give, in greater detail, the step by step action of the Society since 1852, as the Society having published its weekly journal from that date, the whole of the facts are therein recorded.

SOCIAL AND SANITARY MEASURES.

There are, however, other facts of social, sanitary and industrial importance, which have resulted from the Great Exhibition of 1851, to which I must refer; though with reference to the first—the Shoeblack Brigade—the Society had no part in its establishment, yet, as it was created to meet the habits and customs of foreigners likely to visit the Exhibition, it may be said to have grown out of it, and has continued ever since, with great advantage to the poor and industrious boys employed, and to the colonies, to which, after being educated, many of them have been sent, as well as to many classes of residents in the metropolis itself.

Another sanitary result of the Great Exhibition of 1851 was due to the following letter addressed to the Commissioners of Sewers:—

"8th November, 1850.

"MY LORDS AND GENTLEMEN,—We, the undersigned, having regard to the great urgency which exists for the establishment of public water-closets and urinals in the metropolis, an urgency likely to be much increased by the visits of numerous foreigners, who are accustomed to the use of such conveniences in their own capitals, beg leave to request your attention to the following clause in the Metropolitan Sewers Act (11 and 12 Vic., c. 112):—

"'And be it enacted, that it shall be lawful for the Commissioners to provide and maintain water-closets, privies, and like conveniences, in situations where they shall deem such accommodation to be required; and to defray the expenses thereof, and any damage occasioned to any person by the erection thereof, and the expense for keeping the same in good order out of the District Sewers Rate.'

"We shall be much obliged if you will inform us whether you propose to provide these important conveniences, having reference to the great influx of foreigners to be expected next year, before the opening of the exhibition in May.

"In case you have not considered the subject in this aspect, we trust you will do so at your convenience."

This letter of request was signed by 57 persons.

The power which the Act conferred appeared at the time to have been overlooked, or at least had not been acted on up to that date; but it is unnecessary to add, the accommodation therein asked for has, in fact, been since largely provided in many parts of the metropolis and throughout the large towns of the country generally.

To the above statement I must add that the Society, at the cost of Sir Morton Peto, Bart., had two waiting-rooms fitted and opened for public use, one for gentlemen in Fleet-street, and another for ladies in the Strand; but the public did not largely avail themselves of them, being then unaccustomed to the idea of waiting-rooms, lavatories, &c., and the result was a loss of upwards of £900, which was paid by Sir Morton Peto.

THE PATENT LAWS.

I must now travel back to the year 1849, when the Council resolved to appoint a committee to consider and promote, if possible, legislative recognition of the rights of inventors; and in November, 1850, it was announced "That a number of noblemen and gentlemen, members of the Society, have consented to act as a committee for promoting the legislative recognition of the rights of inventors, by means of an easy registration of them in accordance with the principles agreed on by the Council in 1849.

These principles were:—

"1. That inventors, designers, &c., ought not to be subjected to any other expenses than such as may be absolutely necessary to secure to them the protection of their inventions.

"2. That the difficulties and anomalies experienced in connection with patents should be removed.

"3. That the present term of copyright in designs for articles of manufacture, and the protection afforded to the authors and proprietors of inventions and of designs in arts and manufactures, are inadequate.

"4. That for carrying out these objects, the co-operation of all persons interested therein be invited.

"The points on which the committee wish particularly to obtain information are:—1st, the effect which the existing system of patents may have had in suppressing and thus depriving the public of the knowledge and the use of the inventions of those who are unable to bear the heavy expenses required under it. And 2nd, instances where the expenses have been fruitlessly incurred."

At the first meeting of the committee, held on the 19th Nov., 1850, the committee unanimously affirmed the principles on which they were constituted, and resolved to prepare at once the draft of a bill embodying them; and at the second meeting, on the 29th November, the following resolutions were passed:—

"1. That the present tribunals are insufficient for the trial of subjects of designs and inventions.

"2. That there should be penalties for using the title of patent or registered, where none has ever existed.

"3. That registrations of inventions shall be obtainable for a period of one year, on payment of £5; and shall be renewable for four periods, of five years each, on payment of £10 at first renewal; of £20 at second renewal; of £50 at third renewal; and of £100 at fourth renewal.

"4. That the surplus profits, after paying office expenses and compensation, shall be directly applied to some public purpose connected with invention, but not carried to the consolidated fund."

The first report of the committee was ordered by the Council to be printed and published, on the 2nd December, 1850. It reviewed the position of the inventor in this country. A British subject, it stated, has no right of property whatever in the intellectual labour which produces invention or scientific discovery, excepting such as can be obtained by petition from the Crown.

The inventor in France, in America, in Holland, and in Belgium, even in Austria and Spain, has his right recognised by declared law, but the Englishman has none. . . . .

That England presents the anomaly, that, whilst it is the greatest manufacturing nation in the world, possessing boundless capital and most active industrial energy, combined with a vast amount of inventive ability, to which the genius of the people gives the most practical development, the principles of jurisprudence which should regulate its inventive science and its manufacturing skill, are very far behind those of other nations inferior in civilisation to itself.

"The committee will proceed to determine those principles which it has appeared to them ought to regulate the jurisprudence of inventions. . . .

"The peculiar circumstances under which inventors are placed will be first examined. 'It may be impossible,' as a recent treasury report states, 'to ascertain with certainty when grants of letters patent for the sole use of inventors were first made in this country. . . . but the Crown has always been the source of that absolute power which determines rights not otherwise defined, and always possessed the full power of granting letters patent for inventions.' . . . .

"It has appeared to the committee unnecessary to show how the exercise of the royal prerogative since the first letters patent were issued in the third year of King John, A.D., 1,201, affected those rights which, by the progress of the nation, are no longer subjected to the will either of the Sovereign or of the ministry, which have become the responsible interpreters of it; but it must be noticed that whilst many rights and objects were formerly regulated by the legislature, still the Crown continued to exercise a power of granting all that class of smaller personal rights which were generally designated as monopolies. Even this power of granting monopolies became intolerable, and in the 21st of James I., it was taken away by Parliament from the Crown. . . . In the famous Act of the 21st of James I., c. 3, the power of granting monopolies was abolished; but the power of granting letters patent for inventions was left.

. . . . . .

"It must be clearly borne in mind, that no inventor or proprietor of an invention is in any position to claim any right whatever until he has passed through thirty-five official stages of cost and delay."

The committee then proceed to point out the difficulties by which persons holding patents were surrounded, if circumstances rendered an appeal to law necessary, in order that they might maintain their rights, as well as to the efforts which, during the past 20 years,

had been made to amend the system, but all experience had proved that it was hopeless whilst the present system of granting patents existed.

After an elaborate examination into the various views and opinions as to what constitutes an invention, and the conditions under which inventions should be protected by law, the report concluded as follows:—

"It would thus appear that it is simply the business of the state to provide an easy means of registration of claims which the law should regard as valid until they are proved to be otherwise, as it is the case in almost every civilized country but our own. And the establishment of any tribunal to investigate claims either before they are disputed or afterwards, appears altogether a separate and distinct question, quite independent of the policy of recognising the rights of inventors to the fruits of their labour."

Appended to the report was a comparative view of the laws for the protection of inventions in Europe and America.

On the 15th of January, 1851, Mr. Henry Cole, the Chairman of the Council, in his address said:—

"Already the members of the Society may be congratulated on the successful results of the labours of the influential committee of its members, which has been formed to promote the legislative recognition of the rights of inventors. It has been announced that her Majesty's Government are prepared to ask Parliament to confer the right on inventors, to exhibit their inventions at the Great Exhibition, without subjecting them to the pains and penalties for so doing which are entailed by the present system of patent laws, and there can be little doubt that this right, so consistent with honesty and common sense, will be continued beyond the period of the Exhibition. The labours of the Council will not be relaxed in affording every assistance to invest invention with its due rights and position as a science."

A special Act of Parliament was subsequently passed under which inventions were allowed to be exhibited at the Great Exhibition of 1851, upon registration and open to subsequent patent; and in the second report from the committee, printed 22nd of January, 1851, it is stated that, "in addition to the early results of their labours, the committee have received announcements of the formation of numerous committees established with similar objects of promoting complete reform of the patent laws. These committees have been formed in the metropolis, Manchester, Belfast, Birmingham, Leeds, and other places. They have also had brought to their notice the resolution passed at a meeting of the British Association, by a committee consisting of several of its most distinguished members. Some of the views expressed by these committees are announced in the appendix to the report."

The resolutions referred to as having been passed at the British Association were as follows:—

"1. That the patent laws as they now exist are capable of great improvement.

"2. That the right of property in inventions is entitled to as great a protection as the right of property in literature and the fine arts.

"3. That it might be expedient to remove the heavy expense now attending the taking out of patents, and adopt a graduated scale for portions of time renewable, and increasing from a lower to a higher rate.

"4. That previous inquiry by a competent tribunal should take place before granting patents."

The report of the Society's committee then proceeds:—

"The result of the deliberations of the committee has been the production of the following resolutions, which the committee venture to offer to the consideration of her Majesty's Government, as the basis upon which it appears to them that a reform of the present system should be promoted in Parliament.

"1. That everything in respect of which a patent may now be granted should be registered.

"2. That the benefits afforded by registration should extend to the United Kingdom of Great Britain and Ireland and the Channel Islands.

"3. That the registration should be considered merely as a record of claims, and not as any determination of rights between parties.

"4. That it should be competent to an inventor to make disclaimers, and to rectify errors in his specification.

"5. That registration of inventions should be obtainable for a period of one year on payment of £5, and should be renewable for three periods of five years each on payment of £10 at first renewal, of £20 at second renewal, of £50 at third renewal, and a fourth renewal should be obtained upon appeal, as at present, to the Privy Council. (The principle of renewed payments, increasing in amount, is proposed as a means of testing whether an invention is in use, and of removing useless inventive rights that might otherwise be obstructive of improvements.)

"6. That there should be penalties for using the title of "patent" or "registration" where none has ever existed.

"7. That the present tribunals are insufficient for the trial of subjects of designs and inventions.

"8. That it should be permitted to commence actions for infringement of the rights of inventions in the county courts.

"9 That inasmuch as, contrary to expectation, very little litigation has been created by the rights conferred by the Designs Act of 1842 and 1843, the committee is of opinion that a fair trial should be given to the working of the proposed system of registration of inventions, before any special tribunal to determine inventive rights is substituted for existing tribunals.

"10. That any tribunal before which proceedings are commenced should have power to refer any case for report and certificate to the registrar, assisted by competent and scientific persons.

"11. That upon the illegality of the registration being established by the judgment or order of a competent tribunal, the registration should be cancelled.

"12. That there should be only one office for the transaction of business connected with the registration of inventions and the payment of fees thereof.

"13. That every person desiring to register an invention should submit two copies of the specification of his claim, accompanied in every case, when it is possible, by descriptive drawings.

"14. That the mode and procedure of registration should be regulated by the Board of Trade, subject to a report to Parliament.

"15. That an annual report of all specifications registered, with proper indexes and calendars, should be laid before Parliament.

"16. That a collection of all the specifications should be made, calendared, and indexed, and deposited for public information in the British Museum.

"17. That it is highly desirable that such a collection should be printed and published.

"18. That the surplus profits, after paying office expenses, should be directly applied to some public purpose connected with invention, but not carried to the consolidated fund.

"19. That the importation of any patented invention practised abroad ought not to confer a title to registration, except in the case of the proprietors and inventors, within twelve months from the date of the foreign patent, and that no invention of which the patent has expired in any foreign country, or which has been published for a period of twelve months in any foreign country, or which is in free public use in any foreign country, ought to be capable of being registered in the United Kingdom."

The committee in their report review the objections which have been advanced against the principle of registration and progressive fees. They say:—"The argument that the present great cost of patents,

by rendering the rights few, is a benefit to the manufacturers, is unsound. The money test does not determine the merit or legality of the invention, but simply proves that the inventor could either afford to pay the fees, or that he could induce some one else to pay them for him. In short, the very reverse of the inconvenience prophesied may be expected from cheap registration of invention. Make little rights respected, and a better tone of morals is fostered towards all rights, both large and small. . . . . Recognise the rights of inventors, and invention will be elevated into a science. Those who fear such a result are those who fear the spread of education, and are like those who, in the middle ages, would have burned astronomers and metallurgists as witches, and who even within the memory of the present time denied the pretensions of geology or political economy to the rank of a science."

In December 1851, upon the opening of the Society's Exhibition of Inventions, the provisional Registration Bill passed by the Government is thus referred to—"The Act of 1851, allowing a provisional registration in the case of inventions exposed at the Great Exhibition, appeared to the Council to be a great public good, and a reform in the direction recommended in their two reports on the rights of inventors, and it was their wish, if possible, that permission should have been given to expose such inventions at the rooms of the Society after the close of the Great Exhibition, without prejudice to their future patentability; and, in other words, that the principle involved in that Act should be confirmed in other cases than the one which originally gave rise to it.

"As the Board of Trade did not see fit to accede to this request, the present collection has been deprived of a great number of articles of interest and scientific value.

"It is an evidence of the favour with which the public would receive a cheap patent law, such as that recommended by the Council in their two reports, that although the Act of 1851 only came into operation on the 22nd April, the registrations made under it amount to more than a third of the whole number otherwise registered and patented during the twelvemonths ending October 31st. Upwards of 700 persons availed themselves of the Act on this occasion, and registered and exhibited their inventions."

The third report of the committee, printed in January 1852, referred to the attempts made during the last session of Parliament, and the prospects of the present session in improving the patent law. The Council congratulated the Society that the Act passed before the opening of the Exhibition of the Works of Industry of all Nations recognised the right of property in invention, independently of the payment of any fee, upon disclosing the nature of the invention to the public; the simple registration of the right without any preliminary judgment passed on its novelty or merits; the policy of exhibiting and publishing the invention by which the interests of science, as well as those of the public and proprietors, are rendered reciprocal.

The committee state that they had under their consideration the patent bill, which was sent from the Lords to the Commons in the last session of Parliament, and take exception to the creation of a numerous commission of the high officers of state, and other matters in the bill referred to, call attention to the evidence printed in their second report, and add—"With all the experience of the past session, and after the very general discussion on the subject which has taken place, the committee see no reason to modify the resolutions by which they sought to establish the fundamental principles of jurisprudence which should govern improved legislation in the recognition of patent rights, and with increased confidence again submit them to the consideration of the Legislature."

The committee prepared the heads of a bill to embody these resolutions, accompanied with an explanation of the mode in which the system was likely to work.

A bill, embodying in the main the principles laid down by the Society's Committee, was soon afterwards passed by Parliament, and it still continues to be the Patent Law of England. Under it the people of this country have obtained protection at small cost, immediate publication of the specifications, a patent library of reference, and a museum of patents for consultation. This museum is arranged in a temporary building placed on the ground, bought by the commissioners of the Exhibition of 1851.

(*To be continued.*)

Fine Arts.

DISCOVERY OF FRESCOES OF THE 13TH CENTURY.—A very interesting discovery has been made in Christian art in the department of the Gard, in France, by two archæologists of Avignon, the Abbé Pougnet and M. Canron, advocate; in examining the ancient crypt of the parish church of the village of Lirac, in the canton of Roquemaure, they discovered beneath the whitewash of the walls of this underground sanctuary some frescoes which they believe to be the work of artists of the 13th century. The portions which have been cleaned represent a bishop and an apostle, each with the aureola of the saints. The crypt is certainly as old as the thirteenth century, at least, and the architecture, which is excessively simple, is classed as belonging to the transition from the original to the secondary Roman style, but approaching more nearly to the latter than the former. It is probably the primitive church of Lirac; the oldest known documents relating to the village bear date 914.

CASE OF ARTISTIC PROPERTY.—A rather curious question was tried in a law-court in Paris the other day, respecting proprietorship of a photographic negative. M. Yvon, the artist, exhibited some few years since a remarkable picture of the Battle of Solferino, in which a figure of the Emperor on horseback occupied the most conspicuous place. In order to make the resemblance of his Majesty as exact as possible, M. Yvon, with the permission of the Emperor, engaged MM. Bisson to proceed to the Tuileries, and there to produce for him, the artist, and under his directions, a portrait of the Emperor, from which he might finish his work. The portrait was very successful, and the proprietorship of the negative was the matter in dispute. MM. Bisson had since sold their business to M. Placet, who claimed the cliché as his property, but M. Yvon argued that he was the true proprietor, for MM. Bisson only in reality lent the use of their apparatus; he had ordered the portrait which he required, had superintended the pose, and it was to him that the negative should be delivered. The court took M. Yvon's view of the case, and ordered the cliché to be given up, but awarded M. Placet 300 francs by way of compensation.

A STATUE TO LORD BYRON.—The municipal council of Missolonghi has decided on raising a monument to the memory of Lord Byron, who died there in 1824, in gratitude for his efforts in aid of Greek independence. The costs are to be defrayed partly by the municipality and partly by public subscription. A commission has been named to collect the necessary funds.

Manufactures.

PRODUCTION OF LIME IN ITALY.—The number of lime kilns in Italy in 1867 was 4,971, and produced 5,799,383 metric quintals of lime, of the value of 11,557,200 francs. The kilns for burning chalk for agricultural purposes were 891, and produced 1,080,372 quintals, of the value of 1,603,670 francs.

MANUFACTURE OF GUNPOWDER IN ITALY.—Previous to the extension, in 1866, of the monopoly by the state, of the manufacture of gunpowder, there were 90 private gunpowder mills in the various provinces exempt from the monopoly, viz., 69 in Tuscany, 5 in Romagna, 12 in the Marches, and 4 in Umbria. The preparation of powder in these manufactories was carried on in the oldest method, consisting of stamping the material with pestles in wooden mortars. The quantities of powder produced at the three Government manufactories from 1864 to 1867 were as follows:—

	Metrical quintals.
In 1864	11,760
„ 1865	13,454
„ 1866	16,441
„ 1867	14,278

This gives an average annual product of 13,283 quintals of various qualities, viz., 91 quintals finest sporting powder, 173 quintals of fine sporting powder, 537 quintals common sporting powder, 2,448 war powder, 9,579 blasting powder, and 1,155 common gunpowder. The annual cost of this manufacture averages 1,742,440frs., and the average cost per quintal, during the last four years, 126frs. The wholesale prices of sporting powder vary from 4frs. to 8frs. per kil., and retail from 4·50frs. to 8·50frs. per kil.; war powder, 3frs. wholesale, and 3·30frs. retail; blasting powder, 2frs. wholesale, and 2·20frs. retail. The following are the receipts of the sale of gunpowder during four years:—

Years.	Quantity.	Receipts.	Expenses of sale.
	quintals.	frs.	frs.
1864	9,745	2,403,090	135,938
1865	8,353	2,220,933	124,515
1866	6,778	1,798,185	80,240
1867	10,790	2,784,951	140,400

Besides the quantity of powder used by the army and navy, 2,200 quintals are consumed in public works carried out by Government; half this amount is used in the mining operations of the Mont Cenis Tunnel. During the war, in 1866, 13,500 quintals of gunpowder were imported by the War Department, of the value of 2,842,850frs. A Bill has recently been passed in Parliament to abolish the royal monopoly of this manufacture after the 1st January, 1869; private manufacturers will pay a tax on their establishments in proportion to their extent, and a tax of 50 centimes per kil. on all powder manufactured.

Commerce.

COMMERCE OF FRANCE.—Late accounts have shown that the imports from France to England are increasing rapidly, but the same is not the case as regards the rest of the world. It appears, by official returns, that while the value of imports into France during the first nine months of the year have increased in the following ratio:—

	Francs.
1866	2,070,420,000
1867	2,230,003,000
1868	2,543,501,000

the exports, on the contrary, show an inverse ratio, the values being, in—

	Francs.
1866	2,375,365,000
1867	2,089,006,000
1868	2,080,555,000

The deficit is very slight, however, as compared with 1867. The excesses and deficits are naturally not uniform on all articles; in the case of timber there is an increase of more than seven millions of francs in the imports, accompanied by a diminution of nearly three millions in the value of the exports. In the case of marble, stone, bricks, slate, and other building materials, the imports remain very nearly the same, while the exports show an increase of just a million of francs. In metals of all kinds the case is far more favourable to French manufacture, there being a diminution of twelve millions in the imports, side by side with an increase of nearly three millions in the exports. In the case of pig iron the exports have reacted considerably more than fifty per cent. of the imports, while the rails exported give a total of 204,198 francs, against a trifling import of 9,096 francs. The copper trade also progresses rapidly, the export of copper in masses, bars, and sheets amounting to more than five millions of francs, against twenty-six and a-half millions imports, while hammered and rolled copper, and copper wire, show four millions of exports, against 364,397 francs imports. As regards the whole account for timber, stone, marble, metals, &c., the returns show imports amounting to 208 millions of francs, against forty-seven and a-half millions of exports.

NEW TIN MINES IN SIAM.—Another tin district is about to be opened at the Isthmus of Kra. The immense value of the tin workings at Junk, Ceylon, or Phuket, supposed to be not less than 150,000 tons per annum, has incited a Chinese merchant to propose the active development of the Kra mines, and as tin is supposed to abound along the whole range of mountains of the Malay peninsula, there are many who believe in his success. He is to have the government of the district to enable him to carry out his designs. The river of Kra is the southern boundary between British Burmah and Siam, and it would not be surprising were the trade ultimately to flourish better on the British side of the river.

EMPLOYMENT OF COTTON WASTE AS MANURE.—M. Dupont-Poulet, a French cotton spinner, has for the last ten years used his cotton-waste for seed beds and early crops. He mixes it carefully with stable manure, and thus avoids, as he says, the burning and the chills which manure alone often causes. M. Dupont-Poulet's example has been followed by his neighbours, some of whom have gone beyond him; one of them had the idea of using cotton in the forcing of asparagus, that is to say, he spread a layer of cotton-waste, about eight inches thick, over one of his asparagus beds, and found that the snow when falling upon it disappeared very rapidly; he was able, without any other covering but the cotton, to gather fine, tender, well-flavoured asparagus in the midst of winter.

PULSE OIL AND CAKE.—An enormous trade is carried on in China in the manufacture of oil cake from one or two descriptions of pulse. The oil is used both for eating and burning, but principally for the latter purpose. The circular cakes, made from the marc or residue, are largely in demand throughout China as food for live stock and for manure. The peas are ground in a mill, and the oil is pressed out in a rude press, by means of wedges, driven under the outer parts of the framework with mallets. Steam machinery by Messrs. Platt and Co., for the establishment of a pulse cake and oil factory at Newchang, have recently been sent out, and we may shortly expect to see in full operation the novel, interesting, and, as there is every reason to hope, successful experiment of a British steam factory in Manchooria competing with the native manufacturers in the fabrication of one of the chief exports of that extensive region.

Colonies.

FARMING PROSPECTS IN VICTORIA.—The *Australasian*, of the 10th November last, says:—"The agricultural prospects of the country are excellent; the corn crop is now fast ripening, and if the present hopes of the farmers are realised, we shall not only have bread materials enough for our home consumption but some-

thing to spare, perhaps, for other countries. The great question on which the future of Victorian agriculture mainly depends, namely—whether we can grow wheat for sale in the English market at a profit will consequently have to be decided before long. If the price of wheat in London were to keep up to 64s. a quarter, and the price of agricultural labour here to decline somewhat, as it is likely to do, our corn production might be greatly extended with advantage no less to ourselves than to our distant customers. And in some important respects we are well prepared to extend this branch of our business. There have been several agricultural shows lately, and these proved the colony to be extraordinarily rich in many of the principal requisites to agricultural success. As for the machinery exhibited, we doubt if any other new country could make such a display. The high price of hand-labour here, and the affluence of the agriculturists as a class, have combined to make our implement manufacture a very important and extensive local industry, and at the principal spring shows of the year the products of the Melbourne and Ballarat shops worked side-by-side with some of the best implements shown at the Grand Paris Exhibition without shaming their makers. Our soil and the climate are well adapted for the growing of corn for exportation, our farmers are sufficiently skilful, and our farm workmen as expert as any in the world."

PROGRESS OF BALLARAT, VICTORIA.—The national show of agricultural stock produce implements and machinery, which was opened at Ballarat on October 22nd last, was successful beyond precedent. Rich in mineral wealth, and surrounded by one of the finest agricultural tracts of country in the colony, Ballarat is peopled by an active, energetic, and speculative community. Nowhere is the spirit of enterprise more fully developed, and nowhere are there to be found more solid evidences of prosperity, or more signs of progress, than are to be met with in the metropolis of the gold fields. Wonderful as has been the growth of Melbourne, perhaps that of Ballarat is still more surprising, regard being had to the fact that it dates from 1851 only, and, although the jealousies and rivalries of the two municipalities into which it is divided occasionally tend to lessen the success of some of the public movements undertaken in that town, yet there are times in which the inhabitants act together as one man, and communicate an impulse to anything they are bent upon helping forward which is perfectly irresistible. This seems to have been the case with the National Show, and so great was the interest felt in it, that upwards of 10,000 visited it the second day, and over £505 was received at the doors. Among the machinery and implements exhibited were several which proved the inventive genius and mechanical skill of the metal workers and ironfounders, while the live stock and dairy produce sent in excited the commendation of experienced judges, and showed to what a great extent local industry has rendered the inhabitants of Ballarat independent of external sources for the supply of articles of daily consumption, most of which were formerly imported from the other end of the world.

PAPER MAKING IN MELBOURNE.—Since operations were commenced at Mr. Ramsden's paper mill in May last, the manufacture has gone on continuously, no accident having occurred to interrupt the process. The hands employed at the mill have now acquired the requisite familiarity with the work in which they are engaged, and such manual dexterity as considerably lessens the cost of the manufacture. Another improvement is that the raw material is now supplied in greater abundance, new sources of supply having been discovered, such as waste hemp or tow from the adjoining rope works. Experiments have been made with native grasses and fibrous plants which have been so far successful as to show that paper can be made from them, but, hitherto, the cost of working them up has rendered them ineligible as a paper material. Another interesting fact in connection with this new industry is that several native earths have been found of value as colouring matters.

Obituary.

GEORGE LOWE* closed his long, valuable, and honourable career on Christmas-day, at his residence, in St. John's-wood-park, in the 80th year of his age. Mr. Lowe's father was a brewer, at Derby, and his son George was for some years engaged in the same occupation. His attention was at the same time directed to the illumination by coal gas, which was being rapidly developed and extended, and several articles written by him on the subject in Tilloch's *Philosophical Magazine*, which appeared about fifty years ago, showed that he had considered the subject with a clear and comprehensive mind. The knowledge he displayed of the science of gas-making seemed to fit him peculiarly for undertaking the duties of gas engineer, and in 1821 he was appointed one of the engineers of the Chartered Company, which was then beginning to make known the advantages to be derived in the metropolis from the introduction of gas-lighting. That office he continued to hold till the year 1862, when, in consideration of his long and valuable services, the directors of the company gave him a retiring pension equal to the full amount of his salary. Mr. Lowe married about three years before his engagement as engineer to the Chartered Company, and he lost his wife, to whom he was devotedly attached, in 1843. In conjunction with the late Mr. Telford and Mr. (afterwards Sir William) Cubitt, Mr. Lowe aided in the formation of the Institution of Civil Engineers, and he was for many years a member of the council of that institution. In 1835 he was elected a Fellow of the Royal Society, for which honour he was indebted to the production of Prussian blue from ammoniacal liquor and from the refuse lime liquor of gas-works, specimens of which, made by him, attracted the notice of the Duke of Sussex, who was at that time president of the society. Mr. Lowe entered actively into various fields of scientific inquiry, and was elected a Fellow of the Geological, of the Chemical, and of the Microscopical Societies, and he was also elected a corresponding member of the Franklin Institute, which was an honour he much prized, it having been conferred upon him altogether unsolicited. In addition to the responsible office of engineer of the Chartered Company, Mr. Lowe fulfilled at the same time the duties of consulting engineer of the Imperial Continental Gas Association, of the European Gas Company, of the Dublin Alliance Gas Company, and of many other gas companies at home and abroad. The activity of Mr. Lowe's mind developed itself in numerous inventions for improving the manufacture and the illuminating power of gas, of which the Patent Office contains the records. The first invention patented by Mr. Lowe was that known as his "reciprocating retort," dated October 12, 1831. In that invention long retorts were first employed. The usual charge of coal was put in at each end of the retort to half its length, so that the gas of inferior illuminating power evolved from the charge of coal first introduced might mix with the richer gas evolved from the charge introduced subsequently. The same patent comprised the introduction into the furnace of highly-heated atmospheric air, for the purpose of igniting the gases and vapours arising from the lime and ammoniacal liquors placed under the bars of the furnace, the products of which were to be conducted into condensers to produce sulphurous acid, to be afterwards applied to purifying the gas. The specification of the patent further included a means of generating hydrogen gas by passing steam through the incandescent coke withdrawn from the retorts, the gas produced being afterwards enriched by

* Quoted from the *Journal of Gas Lighting* for January 5th.

the process since called carburetting. In the next patent, dated June 9, 1832, the process of carburetting was applied to increase the illuminating power of ordinary coal gas, and with it was combined a process for the production of Prussian blue from ammoniacal liquor and from the refuse lime liquor. A third invention included in the same patent consisted in a means of collecting the tar of different degrees of specific gravity, by self-acting syphons placed at different parts of the condenser. Seven years afterwards a joint patent was obtained in the names of George Lowe and John Kirkham, which comprised five inventions. The first was a modification of Mr. Lowe's reciprocating retort applied to a combination of several retorts. The second invention was a combination of clay and iron retorts, which principle has since been extensively amplified by others. The third related to a mode of applying heat to retorts, during the first hours of distillation, by means of a blast of air into the ash-pit of the furnace. The fourth invention consisted in a mode of employing tar as fuel, by mixing breeze with the tar, which was then introduced into a retort, and the distilled products were conveyed by a pipe to the fire in the furnace. The fifth invention, specified in the same patent, consisted in setting the retorts nearly vertical, and so arranged as to be charged at the upper ends, and from time to time drawn at the lower ends. The novelty of this invention is described as consisting "in so constructing such retorts as to cause the gas evolved from the fresh charges to descend, and pass amongst the highly-heated charges, and mix with the gas evolved therefrom." In March, 1841, Mr. Lowe was again in the Patent Office, with an invention for "improved methods of supplying gas under certain circumstances, and of improving its purity and illuminating power." The specification of this patent was divided into five parts, the three first of which related to improvements in gas-meters, and included Mr. Lowe's motive-power meter, and the means of purifying gas in passing through meters by the introduction into them of alkaline solutions. The fourth part related to the purification of gas in dry purifiers, by causing the gas to pass over a series of shallow trays, containing sponge impregnated with a caustic alkaline solution. The fifth part of the invention consisted in a mode of increasing the illuminating power of coal-gas, by passing it over similar shallow trays containing sponge impregnated with naphtha. A fifth patent, dated October 8, 1846, was granted to Mr. Lowe for "improvements in the manufacture and in burning gas, and in the manufacture of fuel." In this invention blocks of dried peat were immersed in melted resin or pitch in a closed vessel, from which the air was pumped out, to form a material for making gas. It included, also, the application of revolving perforated pipes for distributing water or purifying liquor in gas-washers; and the improvements in burning gas consisted in the adjustment, by screws, of the air supplied internally and externally to the flame of an Argand burner, a button being employed internally to deflect the air on to the flame, and the conical shape of the chimney caused the current of air to be directed on the flame externally. The last appearance of Mr. Lowe's name in the records of the Patent Office is on the 20th of January, 1852, when, in conjunction with Mr. F. J. Evans, he patented an invention for the purification of gas by "anhydrous peroxide of iron," the energies of which might be renewed again and again by exposure to the atmosphere. This patent was dated four days before that of Mr. Hill's for the purification of gas by hydrated oxides. These various patented inventions for improving the manufacture of gas prove that Mr. Lowe's powers of mind were remarkably active and inventive, and that he possessed extensive knowledge of the principles on which the production and purification of gas depend. It will be seen from this cursory survey of his ingenious and well-devised plans, that many subsequent inventors and patentees have derived from Mr. Lowe not only their ideas but the methods by which they were practically applied. In addition to those inventions which he secured by letters-patent, Mr. Lowe contrived many other very useful appliances which he gave to the public, among which is the bladder-valve, that is found so useful in preventing the escape of gas during the laying of mains; and his "jet photometer" is to be found in all well-managed gas-works. It is not, however, by his inventions alone that Mr. Lowe's influence on the progress of gas-lighting is to be estimated. His sound judgment, his varied and practical scientific knowledge, rendered him an authority to be applied to in all questions of doubt; whilst his amiable disposition and courteous manners imparted additional value to his opinions and advice. We fear it will be long before the profession of gas engineering will adequately supply the place once filled by the lamented George Lowe.—He was elected a member of the Society of Arts in 1820, and for many years took an active part in the proceedings of the Society and its various committees.

Publications Issued.

THE REGISTER AND MAGAZINE OF BIOGRAPHY. (*Nichols and Sons.*) The first number of this periodical appeared at the beginning of the month, and is intended to be continued monthly. The object of the work is to furnish a public and permanent record of births, marriages, and deaths, probates of wills, and other interesting personal and domestic events, accompanied with indices, which will afford the inquirer a ready access to whatever information of this nature he may look for. Obituary memoirs of all persons, whose position or actions may be of sufficient importance to entitle them to notice, will be given.

SPON'S DICTIONARY OF ENGINEERING. (*E. and F. Spon.*) The first number of this work was issued at the commencement of the year, and it is to be completed in about sixty fortnightly numbers. It will comprise all matters relating to civil, mechanical, military, and naval and technical terms in French, German, Italian, and Spanish. It is very fully illustrated with numerous woodcuts.

Notes.

WORKING MEN'S CLUBS AT MULHOUSE.—The president of the Industrial Society of Mulhouse, at its last meeting, read a long report, bearing the title "Des Cercles d'Ouvriers àpropos des Working Men's Clubs d'Angleterre." After having sketched the history and development of such clubs, the author of the paper, M. Siegfried, dwelt upon the incalculable advantages that such clubs presented as regarded the morality and education of the poorer classes, and the happy influence which they ought to have upon the relations of employers and workmen, and concluded with the hope that such clubs, having for their object the recreation, as well as the social, intellectual, and moral welfare of the working classes, might be established in France, and especially in Mulhouse. The proposition was received with unanimous approbation by the members of the society present, when the president read a letter from M. Siegfried, in which that gentleman offered to the society, in case his views should meet with approval, the sum of four thousand pounds, for the installation of such a club at Mulhouse. The offer of M. Siegfried was at once accepted, and the prefect of the department being present, promised his assistance in carrying the plan into execution. The Committee of Public Utility has been charged with the examination of M. Siegfried's memoir, and of the series of documents attached to it by way of appendices.

FRENCH FISHERIES.—The statistics of the sea fisheries of France for the year 1867 have recently been published by the Marine Administration in Paris. It appears that the value of the fish taken during the year was £2,649,804, or £316,527 more than during the previous year. The augmentation is attributed principally to the abundance of sardines at certain points, and to the fact that the amount of the sales of these fish had previously been estimated at too low a rate. The cod-fishery is the most important of all the fisheries, and yielded in 1867 £586,608; the sardine fishery stands next, and represents £545,432; the value of the herrings is given at £309,480; of mackerel, £94,317; anchovies, £11,474; shell-fish figure for the sum of £142,618, in which oysters are represented by less than £40,000, and mussels more than £50,000. The small amount set down for oysters is explained by the fact that it only includes those taken from the public beds, and not the whole of the oysters consumed, of which a large part are obtained from beds in private hands. The crustaceans amount to the total sum of £72,868. During the year 1867, 17,544 French fishing boats, manned by 70,125 men were engaged in the fisheries on the coasts of France, the east coasts of England, and in the vicinity of Newfoundland and Iceland. Of these 448 boats and 11,583 men were engaged in cod-fishing.

AGRICULTURAL INVENTION IN RUSSIA.—Under the title of a Permanent Exhibition of Inventions and Improvements, a new section has been added to the museum of agriculture. The object of this new section is to supply those who have invented or improved agricultural machines, implements, or methods, with ready means of communication with agriculturists and the public. The machines, models, plans, or drawings are to be exhibited gratis for six months, at the expiration of which time they will be returned to the inventors or destroyed, unless they should have been purchased for the museum.

POSTAL STATISTICS OF ITALY.—The number of Post-offices in Italy up to the 1st January, 1868, was 2,634, including 10 railway post-offices and 2 on board steamers. In 1867 the total number of letters posted was 79,780,750 (being an increase on that of the previous year of 4,740,691), of which 72,519,427 were stamped, 6,154,805 unstamped, 992,496 registered, and 114,022 insured for the amount of 102,354,292 francs. The number of letters free of tax was 29,816,212; printed matter, 64,271,258, of which 55,731,023 were newspapers and periodicals. The number of money orders issued was 2,373,166, amounting to 126,775,051 francs. The number of money orders sent abroad was 44,225, amounting in value to 4,906,634 francs; whilst the foreign money orders paid in Italy were 56,024, amounting to 4,397,142 francs. The number of postage stamps sold was 91,012,558 for the amount of 12,435,520 francs. The greatest number of letters were posted at Florence; being 5,192,000 in all. The gross receipts of the post amounted to 15,452,430 francs, of which 13,931,827 francs were for letters and stamps, 998,064 francs for money orders, 292,971 francs for newspapers, and 55,828 francs for passengers carried by mail conveyances. Sundry receipts 173,740 francs. The expenses amounted to 16,581,832 francs.

IMPERIAL SOCIETY OF NATURAL SCIENCES, MOSCOW.—This society, whose object is the fitting out of scientific expeditions, the establishment of museums of natural history, and the organization of exhibitions, has just held its fifth annual meeting, and seems to have been actively employed. An expedition into Turkistan has just been arranged with the assistance of General Kaufmann and M. Henis, and three other expeditions have recently been fitted out at the expense of the society—one along the banks of the Black sea, a second to the lakes of the district of Riasan, and a third to the lake Fresta in the Moscow district. It proposes, with the aid of M. Daschkoff, an honorary member, to establish an aquarium at a cost of 30,000 roubles.

Correspondence.

MUSICAL PITCH.—SIR,—The movement for obtaining a reform in the musical pitch of Great Britain, and for establishing a standard to be accepted by makers of musical instruments and musical societies, is acquiring new vigour. No important steps have hitherto been taken for the settlement of this question. Circumstances of late, however, have induced fresh energy into those most interested in this reform, and it is to be hoped that a speedy success may be the result of the endeavours made. At the present time the ultimate purpose appears to be not only the reduction of the musical pitch in Great Britain, and rendering it nearer to what it was some hundred years ago, when some of the most important pieces of musical composition were written, but to the fixing of a standard in England uniform to the pitch now generally adopted in foreign countries. The musical pitch in Handel's time was 419 vibrations per second to produce the note A. It is now as high as 455. This rise, therefore, although in the opinion of great musicians it is considered to give to orchestral music much greater brilliancy, places many passages for the human voice out of all possibility of execution, and causes the rendering of others difficult, at the same time straining the voice of the singer in an unusual manner. The Sacred Harmonic Society, the one society in London who should thoroughly give proof of their high appreciation of what is now somewhat scarce, namely, a good tenor voice, are foremost in upholding a very high musical pitch. The resignation of Mr. Sims Reeves from the staff of artistes is at once a practical proof that, in the opinion of the best tenor singer, the musical pitch at present is too high. It can hardly be allowed by any one, even the most ignorant, that the human voice is to be subservient to the manufactured musical instrument. Still, from existing facts, it appears that such an admission is made by persons regarded as the great musical *cognoscenti* of Great Britain. Unfortunately for the English nation, all musical matters have to be settled as best they may be by those most interested. In foreign countries having musical conservatoires supported and conducted by the State, in order to obtain a reform of a palpable musical error, it is but necessary to send in a well-supported representation of a mistake about which there can be no doubt, and the probability is that it is at once inquired into and rectified. In the absence, however, of such an advantageous system, the best means that can be devised for producing a reform in the musical pitch of Great Britain, and rendering it uniform with that which most foreign countries have adopted, is to influence the most prominent musical societies to adopt in their own orchestras a musical pitch, which shall be more convenient to vocalists than the present one, and which shall correspond to the one adopted as the standard in Paris, Berlin, Vienna, &c., and by this means set an example which minor musical bodies must follow eventually. The six concerts to be given by Messrs. Novello and Co., at St. James's Hall, will be a good inauguration of the commencement of musical pitch reform. The oratorios are to be performed according to the musical pitch of France, and Mr. Sims Reeves will thus, doubtless, with greater facility and less fatigue than heretofore, enable the public to hear him render Handel's sacred tenor solos with even better effect than that to which they have been accustomed at Exeter Hall. That an attempt has been already made by the Society of Arts, as far back as 1860, to reform musical pitch, must not be ignored. Then, however, the result of the deliberations was the recommendation, by a large and influential meeting of the musical profession and amateurs, of a pitch of 528 vibrations for C, and Messrs. Cramer and Co. undertook the manufacture and sale of a tuning-fork of this pitch, which, however, has not hitherto been largely adopted. This is, perhaps, fortunate, as, in my opinion, the object now to be attained

appears to be the establishment of a pitch corresponding to the one fixed upon by France and Germany generally.—I am, &c., A. S. C.

MEETINGS FOR THE ENSUING WEEK.

MON.....Geographical, 8½. 1. Dr. G. Bidie, "Effects on Climate of Forest Destruction in Coorg, Southern India." 2. Capt. Vine Hall, "Description of the Island of Rapa."
Entomological, 7. Annual Meeting.
Actuaries, 7. The President, "On the Mortality Experience of Life Assurance Companies collected by the Institute of Actuaries."
Medical, 8.
London Inst., 6.

TUES ...Royal Inst., 3. Mr. Westmacott, "Fine Art."
Civil Engineers, 8. 1. Mr. Henry Hooper, "On New Ferry and New Brighton Piers." 2. Mr. James R. Mosse, "The Mauritius Railway: Midland Line."
Ethnological, 8. Mr. Hyde Clarke, "On the Proto-Ethnic Condition of Asia Minor, the Chalybes, Idæi Dactyli, &c., and their Relations with the Mythology of Ionia."

WED ...Society of Arts, 8. Mr. Wm. Dean, "Xylography, or Printing and Graining from the Natural Surfaces of Woods."
Geological, 8. 1. Mr. W. H. Baily, "Notes on Graptolites and allied Fossils occurring in Ireland." 2. Mr. W. H. Baily, "Notice of Plant-remains from the county of Antrim." 3. Mr. G. T. Clark, "On Basalt Dykes on the Mainland of India, opposite the Islands of Salsette and Bombay." 4. Dr. Sutherland, "On Auriferous Rocks in South-eastern Africa."
Archæological Assoc., 8.

THUR ...Royal Inst., 3. Prof. Rupert Jones, "Protozoa."
Royal, 8½.
Antiquaries, 8½.
London Inst., 6.
Zoological, 8½.
Philosophical Club, 6.
Artists and Amateurs, 8.
Society of Fine Arts, 8. Mr. Hurlstone, "On the Don Quixote of Cervantes."

FRI .....Royal Inst., 8. Mr. Ruskin, "Flamboyant Architecture of the Somme Valley."

SAT .....Royal Inst., 3. Prof. Odling, "Hydrogen and its Analogues."

Patents.

From Commissioners of Patents' Journal, January 15.

GRANTS OF PROVISIONAL PROTECTION.

Air pumps—3982—A. Barclay.
Animal and vegetable substances, preserving—9—F. Perry.
Boilers—6—T. Green.
Bon-bons—43—A. Tyler.
Bookbinding—16—J. G. Tongue.
Boots and shoes—2800—B. D. Godfrey.
Calendars—3696—J. S. Capelle.
Candlesticks—15—A. Carter and C. R. E. Grubb.
Casks—3947—J. Eldridge and J. Smith.
Casks, &c.—7—T. Green, W. Burrows, and R. Turner.
Circular-saw benches—3650—A. Ransome.
Corn, &c., elevating on to stacks—3951—H. Yorath.
Cotton, &c., machinery for manufacturing—3972—P. and R. Gornall.
Electric telegraphy—3932—J. H. Johnson.
Elevators—3966—J. and A. Hutcheson.
Eyelets—3628—A. N. Burton.
Fabrics, manufacturing in lace machinery—3654—W. Brookes.
Fabrics, producing devices on—3—S. Lyons.
Fabrics, tipping pile—3915—B. Norton.
Fabrics, &c., compound for sizing and dressing—3602—A. M. Clark.
Fabrics, &c., preparing impermeable paper for manufacturing—3970—C. Monestier and I. Bang.
Fibrous materials, combing—10—M. Henry.
Fire-arms—14—W. G. Rawbone.
Fire-arms, breech-loading—36—S. Remington.
Fire-arms, &c., breech-loading—3981—F. A. K. W. von Oppen.
Fire-arms, &c., revolving—3987—W. E. Newton.
Fuel economisers—3749—R. Needham.
Gas-fittings—3975—J. Gedge.
Gum lac, operating upon—3967—T. F. Henley.
Hair ropes, untwisting and separating the fibres of—3980—W. R. Lake.
Hats—3990—J. Seelig.
Horses, knee caps for—3047—R. Ramsay.
Horses, &c., clipping—5—G. Smith.
Horses, &c., shoes for—21—J. McKenny.
Iron and steel—3983—B. Samuelson.
Iron and steel—18—H. A. Bonneville.
Kilns for burning bricks, &c.—13—A. Batchelar.
Lathes, &c., gearing for—1—J. Heap.
Legs, artificial—3973—H. H. Bigg.
Linen, &c., plaiting, &c.—38—J. Stevens.
Madder root, extracting the colouring matter of—3959—G. T. Bousfield.
Mechanical telegraphs—40—J. S. Gisborne.
Mineral teeth—3652—H. A. Bonneville.
Oils, &c., purifying and bleaching—26—W. Prosser.
Ordnance—3797—W. J. Murphy.
Ores, &c., separating—3971—G. Davies.
Paddle wheels—25—S. Bateman.
Paper-making machinery, &c., conducting paper from—3905—G. Tidcombe, jun.
Plants, &c., treating—44—W. Pidding.
Puddling furnaces—4—W. M. Williams.
Purses, &c., fastenings for—17—M. Wolfsky.
Racks, self-acting—3835—J. T. Hall, G. Critchley, and H. B. Fox.
Railway buffers—3989—T. Gibson.
Railways and street tramways—3977—C. de Bergue.
Railways, fixing the rails of—3646—W. MacLellan.
Reaping machines—3790—R. Norfolk.
Rotary fans—27—E. W. and J. Voce.
Scales—3957—J. Gillman.
Screwing and tapping machinery—3963—J. Laurie and J. Whittaker.
Sewing machines—3969—W. Winter.
Sewing machines, &c.—31—J. H. Johnson.
Show cards, &c.—8—B. G. George.
Silk, &c., winding—3726—A. M. Clark.
Slabs, &c., manufacturing dec rative, &c.—41—E. Robbins.
Smoke, consuming—33—G. Smith.
Spanners and wrenchers—3760—W. Gray and T. Biggin.
Spinning machines—3979—W. R. Lake.
Steam engines—35—W. Dawes.
Stone, &c., engraving letters, &c., on—3953—J. A. A. Landa.
Sulphuric acid—42—K. Walter.
Taps and valves—12—S. Smithson, G. Senior, and J. Inman.
Tatting shuttles—3991—C. Shales.
Tobacco pouches—3949—A. S. Harington.
Travelling bags, &c.—3955—I. Pick.
Valves or cocks—20—S. J. Peet.
Vapours, &c., apparatus for inhaling—30—J. Balbirnie.
Velocipedes—11—J. H. Johnson.
Ventilating apparatus—3974—E. T. Noualhier.
Vessels, propelling—3988—R. Griffiths.
Washing machines—3986—H. E. Newton.
White lead—22—J. Major, H. Trigg, and W. Wright.
Wool, &c., paper tubes employed in spinning—3968—J. H. Johnson.
Wrenches—3985—G. M. Wells.
Xyloidine, compounds containing—3984—D. Spill.
Yarn, preparing—2—T. Singleton.

PATENTS SEALED.

2238. T. Shackleton and H. W. Ripley.
2243. W. R. Lake.
2244. W. R. Lake.
2248. E. Funnell.
2257. S. Deacon.
2263. C. G. Johnson.
2265. J. Thomas.
2266. W. Berry.
2270. H. B. Barlow.
2279. R. Brett and G. Daniels.
2281. C. Hodgson.
2299. W. T. Hamilton.
2301. W. T. Hamilton.
2303. S. H. Hadley.
2372. J. Simpson.
2420. J. E. Outridge.
2427. G. Wilson.
2434. G. T. Bousfield.
2735. S. Sharrock.
2948. G. Ritchie.
3292. T. Mordue.

From Commissioners of Patents' Journal, January 19.

PATENTS SEALED.

2271. T. W. Gray.
2272. W. Winter.
2273. W. J. Cunningham.
2276. C. P. Wilcox.
2278. L. Rose.
2284. C. Weekes.
2287. T. Deschamps.
2293. T. Gibb.
2294. G. Martin.
2306. T. F., J., C. H., & E. Firth.
2308. F. H. Hambleton.
2318. M. T. Shaw & T. H. Head.
2322. J. S. Bromhead and J. Whitmel.
2332. W. E. Gedge.
2334. J. H. Johnson.
2353. C. J. Laurendeau.
2393. J. Duguid, jun.
2453. A. V. Newton.
2456. H. Churchman.
2471. B. Hunt.
2497. A. V. Newton.
2506. J. H. Johnson.
2526. G. A. Buchholz.
2528. W. E. Newton.
2536. H. Steffanson & J. Hadley.
2849. F. F. Greenwood.
2872. W. Clissold.
3007. G. T. Bousfield.
3255. E. Wimbridge.
3278. W. Mort.
3331. S. Ault.
3396. W. Manwaring.
3475. H. A. Bonneville.
3483. J. Hare.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

108. J. M. Napier.
168. G. Spencer.
186. G. T. Bousfield.
202. W. Jeffries.
210. J. Stringer and G. Birch.
138. D. F. Lecocq.
140. C. H. Roeckner.
148. R. Cherry, E. Crossley, and W. Bower.
155. C. J. Crondace & J. Field.
169. W. Hibbert.
172. W. Sumner.
209. G. B. Woodruff.
226. J. Howard & E. T. Bousfield.

PATENT ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

140. W. S. Mappin.